

Insuring Nuclear Safety during Decommissioning at Indian Point Energy Center

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Table 3-1 Sample PRA Results Demonstrating Offsite Economic Costs Anticipated for Most Severe Nuclear Accidents

Facility/ Environmental Report Accession #	Unit	Region	Reactor Type	Rated Power Level (MW(t))	Geography	Offsite Economic Cost (Billions of 2019\$)	Frequency (%/year)
Indian Point/ ML071210562	2	I	PWR	3,216	Urban/ Landlocked	42.2	0.000065
	3	I	PWR	3,216	Urban/ Landlocked	36.8	0.0000943
Nine Mile Point/ ML041490222	1	I	BWR	1,850	Rural/ Shoreline	6.05	0.000309
	2	I	BWR	3,467	Rural/ Shoreline	10.89	0.000682
Sequoyah/ ML13024A010	1	II	PWR	1,148	Rural/ Landlocked	11.96	0.0006431
	2	II	PWR	1,126	Rural/ Landlocked	11.96	0.0007409
Fermi/ ML14121A540	2	III	BWR	1,535	Urban/ Shoreline	56.8	0.00072
Waterford/ ML16088A324	3	IV	PWR	3,716	Urban/ Shoreline	29.7	0.000188

Probabilistic Risk Assessments (PRAs) show that while severe operating reactor accidents are unlikely, they are extremely costly if they occur.

“The Price-Anderson Act was enacted by Congress in 1957 for the dual purposes of providing financial protection to the public in the unlikely event of a catastrophic nuclear occurrence and removing barriers to private sector participation in the nuclear power industry resulting from the threat of potentially very significant liability claims in case of a nuclear event.”

“Commercial power utilities were initially wary of the potential liabilities associated with nuclear technology that previously had been the sole province of the Federal Government. Congress eased these concerns by establishing a limit of public liability for a nuclear incident while also establishing requirements to assure adequate financial protection for the public. In addition to fostering the development of the commercial use of nuclear technology, Congress encouraged the private insurance industry to develop a means by which nuclear power plant operators could meet their financial protection responsibilities. The insurance industry chose the “pooling” technique. Pooling provides a way to secure large amounts of insurance capacity by spreading the risk of a small number of exposure units (i.e., reactors and other nuclear-related risks) over multiple insurance companies. ANI and its predecessor entities have served as the U.S. nuclear liability insurance pool since 1956. ANI currently comprises 23 member companies representing more than \$300 billion in surplus from many of the world’s largest and most recognizable insurance entities.”

“ANI [American Nuclear Insurers] is a voluntary, unincorporated joint underwriting association that acts as managing agent for its member companies. Its Board of Directors comprises representatives from its member companies. Several Committees provide input in areas including underwriting, claims, and finance.”

“The association writes nuclear liability insurance for nuclear facilities in the United States. ANI issues policies, collects premiums, handles claims, and otherwise administers the program. Technically, however, ANI is not an insurance company. The insurance is provided by participating member insurance companies, which each receive a pro rata share of the premiums collected.”

Like vehicle and home owners, reactor owners pay premiums for nuclear liability insurance coverage. Keep premiums in mind – the concept will be revisited later.



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Home

Worldwide, nuclear power is the largest source of emission-free electricity.

American Nuclear Insurers was founded in 1956 to provide insurance to the then emerging US nuclear power industry. Today, 33 countries around the world operate 439 commercial nuclear reactors and 52 new nuclear power plants are under construction in 19 countries. With the world's growing commitment to clean, emission-free sources of electric power, the demand for new nuclear power plants and continually evolving nuclear technology will continue to grow — both in the United States and abroad.

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ANI is proud of the role we have played in supporting nuclear electric power. Worldwide, nuclear reactors produce more “clean air” electricity than solar, wind, geothermal, and hydro-power combined. With a renewed emphasis on the essential role nuclear plays in achieving a zero carbon emission environment, we are confident that nuclear will continue to play an important role in the domestic power production well into the future.

Table 3-2 Price-Anderson Act Insurance and Indemnity Framework by Type of NRC Licensee (Based on January 2021 Price-Anderson Act Requirements)

Type of License	Amount of Required Primary Financial Protection	Amount of Required Secondary Financial Protection	Level of Available Government Indemnification ⁷	Annual Indemnification Fee Required
Large, Operating Commercial Nuclear Power Reactors (rated capacity of 100 MW(e) or more)	\$450M (maximum amount available) ⁸	\$137.6M ⁹ per incident for each reactor	\$0	No less than \$100 ¹⁰
Decommissioning Large Commercial Nuclear Power Reactors	\$100M (under consideration by the NRC) ¹¹	\$0 (under consideration by the NRC)	\$460M (under consideration by the NRC)	\$0
Reactors Under 100 MW(e) and Greater than 10 MW(t)	\$4.5M-\$74M ¹²	\$0	\$486M to \$500M	\$30 per 1,000 kW of thermal capacity ¹³
Reactors Under 10 MW(t), Generally	\$1M-\$2.5M ¹⁴	\$0	\$500M	\$30 per 1,000 kW of

Currently, each owner of an operating reactor is required to obtain \$450 million of liability protection against a severe accident of that reactor.

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Additionally, each owner of an operating reactor may get invoiced up to \$137.6 million in event a severe accident at another reactor exceeds the \$450 million primary protection level.

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The NRC has been granting exemptions and is pursuing rulemaking to drop the primary liability protection level per decommissioning reactor to \$100 million and dropping those reactors from the secondary pool.

Table 2-9 Types of Facilities and Related Operations Insured by American Nuclear Insurers in the United States (ANI, 2019)

Type of Risk	Number of Policies
Operating Power Reactors Sites*	58
Non-power Reactors, including University Reactors	10
Fuel Fabrication/Enrichment Facilities	5
Waste Disposal/Storage Facilities	2
Miscellaneous Nuclear Facilities, including Nuclear Laundries and Research Laboratories	24
Discontinued/Decommissioned Facilities Operations	18
Suppliers and Transporters	166

** There were 98 reactor units operating at these 58 sites*

“Liability premiums vary from one location to another, based on individual risk characteristics. In 2019, the average premium for policies providing the maximum limit of \$450 million at a one-unit reactor site was \$987,000; \$1.5 million at a two-unit reactor site; and \$1.9 million at a three-unit reactor site.”

“[C]overage under ANI’s Facility Form policy can apply to claims for radiation-related bodily injury or property damage caused during the policy period if such claims are brought within 10 years of policy cancelation or termination. For an ENO [extraordinary nuclear occurrence], the 10-year “discovery period” is extended to 20 years from the date of the occurrence.”

Returning to premiums for nuclear liability insurance, annual premiums of about one to two million dollars are paid by owners of operating nuclear plants for protection against claims filed up to 20 years after the policy is canceled or terminated.

“2.3.5.2 Calculations of Premiums for the Facility Form Policy

To provide consistency in the treatment of similar risks, the premiums that apply under Facility Form policies issued to reactor operators are developed based on a careful review of the following risk characteristics:

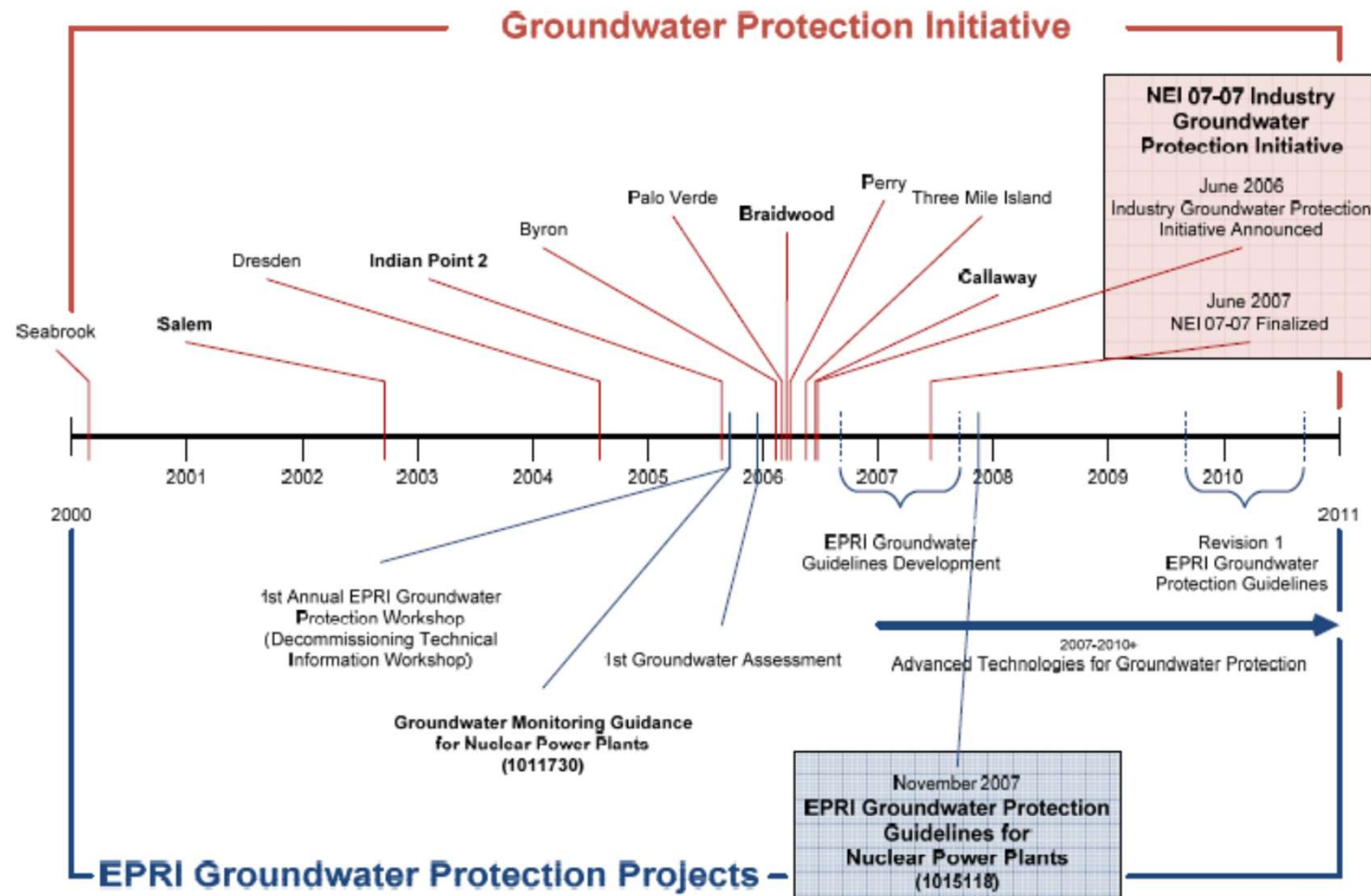
- reactor type (boiling water, pressurized water, gas-cooled)**
- reactor use (power, test, training, research, etc.)**
- reactor size (MW(t) power level)**
- reactor location (population densities, property values, etc.)**
- reactor containment (fully or less than fully contained)**
- reactor operating history (environmental releases, regulatory performance, abnormal occurrences, etc.)”**

...

“In reviewing a reactor’s operating history, the performance of each reactor is measured against the performance of all insured reactors. Premium credits or charges are applied to reflect individual reactor performance.”

One of the factors determining the annual premium amount is the reactor’s operating history. As performance drops, premiums rise.

Nuclear Industry Groundwater Protection Initiative & EPRI Technical Projects



A spate of spills and litany of leaks prompted the nuclear industry to “voluntarily” implement a Groundwater Protection Initiative.

MAJOR FUNDING RISKS

- Early shutdown
- Increase in physical work
 - Unidentified scope (e.g., tritium contamination)
 - Changes in requirements (e.g., termination criteria)
- Schedule delays
- Insufficient NDT earnings
- Higher than assumed cost escalation

Tritium contamination from spills and leaks increased the decommissioning costs at Haddam Neck (CT) and Yankee Rowe (MA) and may boost costs at other plants.

Historic Industry Experience

- ❖ Many sites installed wells to monitor for leaks to groundwater at ANI request.
 - ANI Recommendations
 - Underwriting Adjustments
- ❖ Wells provided indication of piping, pond, tank or SFP integrity breaches

— "Rets-Remp Workshop 2008" —



Contamination from spills and leaks could cause harm to individuals onsite and to individuals and property offsite – harm that might force ANI to pay out claims. ANI sought to avoid such payments by encouraging owners to expand onsite monitoring wells and/or by underwriting adjustments (a.k.a. higher premiums).

Industry Initiative Objectives

- Improve management of inadvertent liquid radiological releases
- Prevent migration of licensed radioactive materials offsite
- Quantify impacts on decommissioning
- Enhance public trust and confidence

The nuclear industry volunteered for the Groundwater Protection Initiative rather than endure increased annual premiums.

D 5.6 Radiological Ground Water Monitoring Program (RGWMP)

The purpose of the RGWMP is to monitor, investigate, and characterize any contamination of groundwater from licensed radioactive material at Indian Point Energy Center (IPEC).

- a. The program is also required in order to meet the following objectives:
- The Nuclear Energy Institute Groundwater Protection Initiative (NEI-07-07),
 - American Nuclear Insurers Guideline for unmonitored releases (ANI 07-01),
 - EPRI Groundwater Protection Guidelines, (report #1015118, Nov 2007),
 - NRC Information Notice 2006-13, Groundwater Contamination Due to Undetected Leakage of Radioactive Water,
 - IPEC commitments to the NRC, Entergy Letter NL-06-033, “Current Status/Future Plans Regarding Onsite Groundwater Contamination at IPEC”,
 - IPEC commitments to the NRC, Entergy Letter NL-08-079, “Remediation and Long Term Monitoring of Site Groundwater”.

As this Holtec report from June 2022 indicates, groundwater monitoring at Indian Point is required to meet commitments to NEI, ANI, EPRI, and NRC. NEI and NRC have fiduciary obligations to verify that the commitments are met; ANI has financial interests in having the commitments met.

“In reviewing a reactor’s operating history, the performance of each reactor is measured against the performance of all insured reactors. Premium credits or charges are applied to reflect individual reactor performance.”

Potential harm from leaks and spills of radioactively contaminated water is not ANI’s only concern. ANI has engaged the NRC and the nuclear industry to improve fire protection measures, enhance inspections of piping for thermal fatigue damage, and upgrade worker training. Any gains from these efforts lessened the chances of harm to workers, the public, and the environment and the payment of insurance claims – a win-win.

ANI has been actively engaged during decommissioning efforts at Indian Point, protecting its interests as well as those of the public. If ANI is dissatisfied with performance at Indian Point, it can lessen that discomfort by increasing annual insurance premiums.

Holtec, New York State, NRC and ANI all seek to avoid problems during Indian Point’s decommissioning. While no entity’s efforts are 100% effective, the multiple efforts lessen the odds that all fail to avert problems with serious consequences.